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SAFETY DATA SHEET

Section 1. Identification

Product Name: Pentamethylcyclopentadienylmolybdenum dicarbonyl dimer
Product Type: Solid
CAS Number: 12132-04-6
Product Number: MO2046
Recommended Use: Laboratory chemicals, synthesis of substances.
Uses Advised Against: This product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by Ereztech LLC.
Product Manufacturer: Ereztech LLC
11555 Medlock Bridge Road, Suite 100
Johns Creek, GA 30097
Product Information: (888) 658-1221
In Case of an Emergency: CHEMTREC: 1-800-424-9300 (USA);
+1 703-527-3887 (International); CCN836180
*** Contact manufacturer for all non-emergency calls.

Section 2. Hazards Identification

Appearance/Odor: Dark red-maroon powder, odor not determined.
Classification: ACUTE TOXICITY, ORAL - Category 2, H300
ACUTE TOXICITY, INHALATION - Category 1, H330

GHS Label Elements
Hazard Pictograms:

Signal Word: DANGER
Hazard Statements: H300 + H330: Fatal if swallowed or if inhaled.
Precautionary Statements
Prevention: P260: Do not breathe dusts, aerosols, vapors or gases.

Section 2. Hazards Identification

Prevention (cont.):
P264: Wash hands and exposed skin thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or with adequate ventilation.
P284: In case of inadequate ventilation wear respiratory protection.

Response:
P301 + P316: IF SWALLOWED: Get emergency medical help immediately.
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P316: Get emergency medical help immediately.
P330: Rinse mouth.

Storage:
P403 + P233: Store in a well-ventilated place. Keep container tightly closed.
P405: Store locked up.

Disposal:
P501: Dispose of contents/container in accordance with federal, state and local regulations.

OSHA/HCS status:
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Hazards Not Otherwise Classified (HNOC):
None identified.

Section 3. Composition/Information on Ingredients

Substance Type : Mono-constituent

Synonyms : Dicarbonyl(pentamethylcyclopentadienyl)molybdenum dimer; Carbon monoxide, molybdenum(3+), 1,2,3,4,5-pentamethylcyclopentane.

Formula : $C_{24}H_{30}Mo_2O_4$

Molecular Weight : 574.37 g/mol.

EC-No. : 623-242-4

Component Name	%	CAS Number
Pentamethylcyclopentadienylmolybdenum dicarbonyl dimer	≥ 99	12132-04-6

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First Aid Measures

General Advice: Move out of dangerous area. Get emergency medical help immediately. Show this safety data sheet to the doctor in attendance. If unconscious, place in recovery position and get medical help immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Eye Contact: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses if easy to do. Continue rinsing. Get medical help if irritation develops and persists, if symptoms develop or if you feel unwell.

Skin Contact: Take off contaminated clothing and shoes immediately. Wash off contaminated skin with plenty of water. Get emergency medical help immediately.

Inhalation: Product exposure is fatal if inhaled. Get emergency medical help immediately. Rescuer should wear a mask or self-contained breathing apparatus if it is suspected that fumes or gases are still present. Remove person to fresh air and keep comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Do not use the mouth-to-mouth method of resuscitation if victim ingested or inhaled the product; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical devices.

Ingestion: Product exposure is fatal if ingested. Get emergency medical help immediately. Rinse mouth, and then give water to drink (two glasses at most). Do NOT induce vomiting. Remove dentures if any. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If person is not breathing, if breathing is irregular or if respiratory arrest occurs, see the Inhalation first aid measures noted above.

Most Important Symptoms/Effects, Acute and Delayed Potential Acute Health Effects

General: Acute molybdenum intoxication may be expected to produce symptoms of diarrhea, anemia (decreased hemoglobin concentration in the blood) and fatigue. Exposure to high doses of this product may be expected to have toxic effects on the liver and kidneys.

Eye Contact: Product may cause eye irritation. Symptoms may include watering, redness and blurred vison.

Inhalation: Exposure through inhalation may result in delayed pulmonary edema, which may be fatal. Symptoms may include a burning sensation, coughing, wheezing, laryngitis, shortness of breath/ difficulty in breathing (dyspnea), blueness (cyanosis) of lips and skin, nausea, headaches, disorientation, general weakness, loss of consciousness and death.

Skin Contact: Symptoms may include reddening of skin, a burning or itching sensation, shortness of breath/ difficulty in breathing (dyspnea), blueness (cyanosis) of lips and skin, nausea, headaches, disorientation, general weakness, loss of consciousness and potentially death.

Section 4. First Aid Measures

Ingestion: Product exposure is fatal if ingested. Symptoms may include shortness of breath/ difficulty in breathing (dyspnea), blueness (cyanosis) of lips and skin, nausea, headaches, disorientation, general weakness, loss of consciousness and death.

Indication of Immediate Medical Attention and Special Treatment Needed, If Necessary

Notes to Physician: Treat symptomatically.

Specific Treatments: No specific treatment.

Protection of First Responders: No action taken shall be taken involving any personal risk without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See Toxicological Information (Section 11)

Section 5. Fire Fighting Measures

General Hazards: Inhalation or ingestion of this product is fatal. Prevent the formation and inhalation of dusts, aerosols, vapors and gases.

Suitable Extinguishing Media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media: None identified.

Unusual Fire and Explosion Hazards: None identified.

Product of Combustion: Products of combustion include carbon oxides (CO_X) and molybdenum oxide fumes. Irritating fumes and organic acid vapors may be generated during exposure to elevated temperatures or open flame.

Protection of Firefighters: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

To reduce the possibility of explosion, use a water spray or fog to reduce direct vapors and to cool unopened containers.

Fire-fighters should wear appropriate protection equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in a positive pressure mode.

Section 6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures

For Non-Emergency Personnel: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas.

Section 6. Accidental Release Measures

For Non-Emergency Personnel: (cont.)

Keep unnecessary and unprotected personnel from entering area. Do not touch or walk through spilled material. Prevent the formation and inhalation of dusts, aerosols, vapors and gases. Provide adequate ventilation. Wear respiratory protection. Put on appropriate personal protective equipment.

For Emergency Responders:

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For Non-Emergency Personnel".

Environmental Precautions:

Do not allow dispersal of spilled material and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for Containment

General:

Move containers from spill area if safe to do so. Prevent the formation and inhalation of dusts, aerosols, vapors and gases. Dispose of collected spillage in accordance with federal, state and local regulations. Contaminated binding material may pose the same hazard as the spilled product.

Small Spill:

Collect spillage with a dry, binding material (e.g. dry sand, vermiculite or diatomaceous earth) and place in sealed container for disposal (see Section 13).

Large Spill:

Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with a dry, binding material (e.g. dry sand, vermiculite or diatomaceous earth) and place in sealed container for disposal (see Section 13).

Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and Storage

Precautions:

Prevent the formation and inhalation of dusts, aerosols, vapors and gases. Ensure adequate ventilation. Keep container tightly sealed. Prevent contact with skin, eyes and clothing. Do not ingest.

Protective Measures:

Put on appropriate personal protective equipment (see Section 8). Keep in the original container kept tightly closed when not in use.

Section 7. Handling and Storage

Protective Measures (cont.): Empty containers retain product residue and can be hazardous. Do not reuse container.

General Occupational Hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Safe Storage Conditions: Store in original container protected from direct sunlight in a dry and well-ventilated area, away from incompatible materials and food and drink. Keep container tightly closed and sealed until ready for use.

Section 8. Exposure Controls/Personal Protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because work environments and material handling practices vary, safety procedures should be developed for each intended application. While developing safe handling procedures, do not overlook the need to clean equipment and conduct regular repairs. Waste from these procedures should be handled in accordance with Section 13.

Occupational Exposure Limits: Product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Controls: Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute. Provide an eyewash/shower station.

Environmental Exposure Controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual Protection Measures

Hygiene Measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Remove all soiled and contaminated clothing immediately. Avoid the formation and inhalation of dusts, aerosols, vapors or gases.

Section 8. Exposure Controls/Personal Protection

Hygiene Measures (cont.): Avoid contact with eyes and skin. Do not ingest. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/Face Protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to dusts, aerosols, vapors and gases. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles, faceshield (8-inch minimum). Refer to 29 CFR 1910.133, ANSI Z87.1, or European Standard EN166.

Skin Protection

Hand Protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: Chemical-resistant gloves.

Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. For full contact, use Neoprene or nitrile rubber.

Other Skin Protection: Appropriate footwear (closed toe) and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory Protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Section 8. Exposure Controls/Personal Protection

Respiratory Protection (cont.): Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Section 9. Physical and Chemical Properties

Physical State:	Solid (powder).
Color:	Dark red-maroon.
Odor:	No data available.
Odor Threshold:	No data available.
pH:	No data available.
Melting Point:	219 °C (426.2 °F).
Boiling Point:	No data available.
Flash Point:	Not applicable.
Auto-ignition temperature:	No data available.
Density:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	No data available.
Water Solubility:	No data available.

Section 10. Stability and Reactivity

Reactivity:	No data available.
Chemical Stability:	Stable under recommended storage conditions.
Conditions to Avoid:	Exposure to elevated temperatures.
Incompatible Materials:	Strong oxidizing agents.
Hazardous Decomposition Products:	Hazardous decomposition products formed under fire conditions: carbon oxides (CO_X) and molybdenum oxide fumes. Irritating fumes and organic acid vapors may be generated during exposure to elevated temperatures or open flame. In the event of a fire: see Section 5.
Possibility of Hazardous Reactions:	Under normal conditions of storage and use, hazardous reactions will not occur. Hazardous reactions or instability may occur under certain conditions of storage or use.

Section 11. Toxicological Information

Information on Toxicological Effects

Acute Toxicity	:	Product exposure is fatal if inhaled or ingested.
Irritation/Corrosion	:	No specific data available.
Sensitization	:	No specific data available.
Germ Cell Mutagenicity	:	No specific data available.
Carcinogenity		
IARC	:	No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH	:	No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by ACGIH.
NTP	:	No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by NTP.
OSHA	:	No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by OSHA.
Reproductive Toxicity	:	No specific data available.
Teratogenicity	:	No specific data available.
Specific Target Organ Toxicity (Single Exposure)	:	No specific data available.
Specific Target Organ Toxicity (Repeated Exposure)	:	No specific data available.
Aspiration Hazard	:	No specific data available.
Information on the Likely Routes of Exposure	:	Common routes of exposure: inhalation (failure to prevent dust formation), dermal (failure to use skin protection), eye (failure to use safety eyewear). Less common: ingestion (failure to employ recommended hygiene measures (e.g. smoking after handling product without washing hands or using hand protection).
Additional Information	:	To the best of our knowledge, the chemical, physical and toxicological properties of this product have not been thoroughly investigated.

Section 12. Ecological Information

Numerical Measures of Toxicity	:	No specific data available.

Section 12. Ecological Information

Persistence and Degradability

Biodegradability : No specific data available.

Bioaccumulative Potential : No specific data available.

Mobility in Soil : No specific data available.

Results of PBT and vPvB Assessment : PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

Endocrine Disrupting Properties : No specific data available.

Other Adverse Effects : An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Section 13. Disposal Considerations

Waste Treatment Methods

Product : Dispose of in accordance with local, state, and federal regulations. Refer to 40 CFR 260-299 for complete waste disposal regulations. Consult your local, state, or federal agency before disposing of any chemicals.

Contaminated Packaging : Empty containers retain product residue (dusts, liquids, vapors and gases) and can be dangerous. Dispose of as unused product.

Section 14. Transport Information

	DOT	IMDG	IATA
UN Number	UN3466	UN3466	UN3466
UN Proper Shipping Name	Metal carbonyls, solid, n.o.s. (pentamethylcyclopenta-dienylmolybdenum dicarbonyl dimer)	METAL CARBONYLS, SOLID, N.O.S. (pentamethylcyclopenta-dienylmolybdenum dicarbonyl dimer)	Metal carbonyls, solid, n.o.s. (pentamethylcyclopenta-dienylmolybdenum dicarbonyl dimer)
Transport Hazard Classes	6.1	6.1	6.1
Packing Group	II	II	II
Environmental Hazards	-	-	-
Additional Information	-	EMS-No: F-A, S-A	-

Section 14. Transport Information

Special Precautions for User : Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transporting in Bulk According to Annex II of MARPOL 73/78 and the IBC Code : Not applicable - this cargo is not intended to be carried in bulk.

Section 15. Regulatory Information

TSCA (Toxic Substance Control Act):
This product is not listed on the U.S. Toxic Substances Control Act Chemical Inventory (TSCA Inventory). Use of this product is restricted to research and development only. This product must be used under the supervision of a technically qualified individual as defined by the TSCA. This product must not be used for commercial purposes or in formulations for commercial purposes.

SARA 302 Components
This product does not contain any components which are subject to the reporting requirements of SARA Title III, Section 302 EHS TPQ.

SARA 304 Components
This product does not contain any components which are subject to the reporting requirements of SARA Title III, Section 304 RQ.

SARA 311/312 Hazards
Acute Health Hazard (Acute toxicity (ingestion, inhalation)).

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Water Act
Not applicable.

Clean Air Act
Not applicable.

CERCLA Reportable Quantity
This product does not contain any chemical components with known CAS numbers with a CERCLA Reportable Quantity.

US State Right-to-Know Listings

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Pentamethylcyclopenta -dienylmolybdenum dicarbonyl dimer	-	-	-	-	-

X – Listed.

Section 15. Regulatory Information

US State Chemicals of High Concern Listings

Component	Maine	Vermont	Washington
Pentamethylcyclopentadienylmolybdenum dicarbonyl dimer	-	-	-

X – Listed.

California Proposition 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Section 16. Other Information

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

HMIS Rating

HEALTH	4
FLAMMABILITY	1
PHYSICAL HAZARD	0

History

Date of Issue/Date of Revision : 12/5/2024.

Date of Previous Issue : None.

Section 16. Other Information

References : None available

Abbreviations and Acronyms

ACGIH	:	American Conference of Governmental Industrial Hygienists.
ATE	:	Acute Toxicity Estimate (per Chapter 3.1 of GHS 10 standard).
BEI	:	Biological Exposure Indices (ACGIH).
CAS	:	Chemical Abstracts Service (division of the American Chemical Society).
CLP	:	Classification, Labeling and Packaging (European Union (EU)).
DOT	:	US Department of Transportation.
EC No.	:	The EC Inventory (EINECS, ELINCS and the NLP-list is the source of the seven digit EC number, an identifier of substances commercially available with the EU (European Union).
EINECS	:	European Inventory of Existing Commercial Chemical Substances.
EHS	:	Extremely Hazardous Substance.
ELINCS	:	European List of Notified Chemical Substances.
GHS	:	Globally Harmonized System of Classification and Labeling of Chemicals.
HAP	:	Hazardous Air Pollutants (Clean Air Act).
HMIS	:	Hazardous Materials Identification System.
HNOC	:	Hazards Not Otherwise Classified.
IARC	:	International Agency for Research on Cancer.
IATA	:	International Air Transport Association.
IATA-DGR	:	Dangerous Goods Regulations by the "International Air Transport Association" (IATA).
IDLH	:	Immediately Dangerous to Life or Health (US National Institute for Occupation Health and Safety (NIOSH)).
IMDG	:	International Maritime Code for Dangerous Goods.
IP	:	Intraperitoneal.
IV	:	Intravenous.
NFPA	:	National Fire Protection Association.
NIOSH	:	National Institute of Occupational Safety and Health.
NSRL	:	No Significant Risk Levels.
NTP	:	National Toxicology Program.
OECD	:	Organization for Economic Co-Operation and Development.
OEL	:	Occupational Exposure Limit.
OSHA	:	Occupational Safety and Health Administration.
PBT	:	Persistent Bioaccumulative and Toxic.
PEL	:	Permissible Exposure Limits.
REL	:	Recommended Exposure Limits.
RQ	:	Reportable Quantity.
SARA	:	Superfund Amendments and Reauthorization Act.
STEL (ST)	:	Short Term Exposure Limit (ACGIH/NIOSH)
STOT	:	Specific Target Organ Toxicity.
TLV	:	Threshold Limit Values (ACGIH).
TPQ	:	Threshold Planning Quantity.

Section 16. Other Information

Abbreviations and Acronyms (cont.)

TWA	:	Time Weighted Average.
VOC	:	Volatile Organic Compound.
vPvB	:	Very Persistent and Very Bioaccumulative.

Disclaimer

The information herein is believed to be accurate and is presented in good faith; however, no warranties or representations are made by Ereztech LLC regarding the accuracy or completeness of the information. Ereztech LLC shall not be liable for any damages resulting from the handling, or from the contact with the above product.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.